REMARKS

A. Introduction

Claims 1-29 were pending and under consideration in the application, claims 30-60 having been previously canceled.

In the Office Action mailed July 9, 2009, claims 1-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chandrasekaran, U.S. 6,949,044, (hereinafter *"Chandrasekaran")*, in view of Kim, U.S. 6,718,436, (hereinafter "*Kim").*

B. Rejections under 35 U.S.C. §103(a)

Claims 1-29 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Chandrasekaran*, in view of *Kim.*

Chandrasekaran relates to techniques for improving the efficiency of data access in a storage area network. A virtual disk address is mapped to a particular physical partition in a virtual disk while recognizing the mirroring, striping, and concatenation characteristics associated with the virtual disk. A variety of indices are used to allow direct access of a physical partition upon identification of a virtual disk address. *Chandrasekaran*, abstract.

The Office Action asserted that *Chandrasekaran* discloses a set of storage processors each maintaining virtual volume objects comprising at first tier objects reflecting a relationship between the physical block addresses and one or more logical partitions of virtual volume data, and second tier objects reflecting a logical configuration of the virtual volume. The assertion is not supported by the actual text of the reference cited by the Office Action, reproduced below.

> In another embodiment, a fibre channel switch is provided. The fibre channel switch includes an interface and a processor. The interface is configured to receive a disk access request at a fibre channel switch from a host. The disk access request identifies a transfer length and a virtual disk address in a virtual disk address space associated with the host. The processor is coupled to the interface. The processor is configured to identify an entry in an index. The entry corresponds to the virtual disk address in the virtual disk address space. The entry provides access to a physical partition.
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> In another embodiment, a method for accessing data is provided. The method includes receiving a

persistent storage access request at a fibre channel switch from a host. The persistent storage access request identifies a transfer length and a virtual address in a virtual persistent storage address space associated with the host. An entry in a physical partition index is identified. The physical partition index is associated with a plurality of physical partitions. The entry corresponds to the virtual address in the virtual persistent storage address space. The entry references a target physical partition having a first size.

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In typical implementations of fibre channel, a host 111 does not simply provide read or write information to a single storage device. Instead, techniques such as virtualization and mapping are used to spread the data across multiple storage devices.

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In one embodiment, the virtual access by the host is represented as a virtual logical unit read or write at a logical block address (LBA) combined with a virtual logical unit transfer length. Features such as mirroring, striping, and concatenation are described in the "Raid Advisory Board Guide To Non-Stop Data Access", by Joe Molina, available from the Raid Advisory Board, the entirety of which is incorporated by reference for all purposes.

FIG. 2 shows one example of striping across multiple virtual disks. According to various embodiments, a switch writes data segments 211, 213, and 215 in a virtual disk address space 201 to a storage device. Any virtual representation of a storage device with addresses that are mapped to particular physical partition addresses is referred to herein as a virtual disk address space. A particular address in the virtual disk address space is referred to herein as a virtual disk address. It should be noted that the virtual disk address space 201 may be maintained in one or more fibre channel switches and each virtual disk address space 201 is typically associated with a particular host or a particular user accessing the host. In typical implementations, a host reads and writes data into this virtual disk address space without knowing where the data is ultimately stored. In one example, the data segments 211, 213, and 215 are striped across multiple virtual disks 241, 243, and 245. According to other embodiments, each virtual disk includes multiple physical partitions. That is, each virtual disk includes physical partitions of storage devices that are be spread throughout a storage area network. Some of these physical partitions may not be directly connected to the same fibre channel switch.

Striping is typically used to improve data access efficiency. During a read access, multiple virtual disks and typically multiple different physical partitions are accessed for data segments 221, 223, and 225. Instead of accessing a single physical partition, multiple physical partitions may be accessed simultaneously to more efficiently gather the data block. During a right access, data segments 211, 213, and 215 are written substantially simultaneously to different virtual disks and consequently, in typical cases, different physical partitions. Having different physical partitions receive data simultaneously is typically more efficient than writing the entire block of data to a single physical partition.

FIG. 3 is a diagrammatic representation showing mirroring across multiple virtual disks. A host issuing a read access request for data segments 311, 313, and 315 in a virtual disk address space is actually accessing data segments 321, 323, and 325 in a virtual disk 341. A virtual disk 341 may include multiple physical partitions in separate physical disks. According to various embodiments, a fibre channel switch automatically mirrors the data onto virtual disks 343 and 345. If a virtual disk 341 has physical partitions that become corrupted, a fibre channel switch can retrieve the data from a different virtual disk 343.

> It should be noted, that in many implementations both striping and mirroring are used. In one example, data is striped to the second virtual disk and mirrored to a third and fourth virtual disk.

As noted in Applicants' response to the prior non-final Office Action, and during an Examiner Interview on April 14, 2009, it is unclear which features of *Chandrasekaran* are considered by the Office Action to correspond to elements of Applicants' claims. For example, none of the terms "virtual volume objects", "first tier objects", "second tier objects", "local second tier objects", and "remote second tier objects" are found in *Chandrasekaran*. The Office Action failed to identify which features in *Chandrasekaran* are considered to read on at least the foregoing recited elements.

As a result, the Office Action failed to establish a prima facie case of obviousness. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness". In re Kahn 441 F. 3d 977, 988 (Fed. Cir. 2006) MPEP 2141 III.

Kim fails to cure the deficiencies noted above. *Kim* discloses techniques for managing a logical volume to minimize a size of metadata and support dynamic online resizing. The Office Action (citing Abstract, Figs 4-7 and 11, col. 4, lines 7-54, and col. 7, lines 7-24) asserted that *Kim* discloses first tier objects have logical connections to both local second tier objects associated with a shared storage processor and to remote second tier objects associated with at least another storage processor.

The assertion, even if true, would fail to cure the deficiencies noted above.

Moreover, the assertion is not supported by the actual text of the reference cited by the Office Action. It is again unclear which features in *Kim* are considered by the Office Action to correspond to elements of Applicants' claims. None of the terms "first tier objects", "second tier objects", "local second tier objects", and "remote second tier objects" are found in *Kim*. The Office Action failed to identify which features in *Kim* are considered to read on at least the

foregoing recited elements.

As a result, claim 1 is patentable over the combination of *Chandrasekaran* and *Kim*. The remaining claims, claims 2-29 depend, directly or indirectly, from claim 1 and are patentable for at least the reasons given above.

C. Conclusion

In view of the foregoing, it is submitted that claims 1-29 are allowable and early notice to that effect is respectfully requested.

If the Examiner believes that, for any reason, direct contact with Applicants' attorney would help advance the prosecution of this case to finality, the Examiner is invited to telephone the undersigned at the number given below, for purposes of arranging for a telephonic interview. Any communication initiated by this paragraph should be deemed an Applicant-Initiated Interview.

If any further fees are required in connection with the filing of this amendment, please charge the same to out Deposit Account No. 19-3140.

Respectfully submitted,

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